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Conference Abstract

DNAqua-Net or how to navigate on the stormy waters of standards and legislations

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Abstract

Several national and international environmental laws require countries to meet clearly defined targets with respect to the ecological status of aquatic ecosystems. In Europe, the EU-Water Framework Directive (WFD; 2000/60/EC) represents such a detailed piece of legislation. The WFD that requires the European member countries to achieve an at least 'good' ecological status of all surface waters at latest by the year 2027. In order to assess the ecological status of a given water body under the WFD, data on its aquatic biodiversity are obtained and compared to reference status. The mismatch between these two metrics then is used to derive the respective ecological status class. While the workflow to carry out the assessment is well established, it relies only on few biological groups (typically fish, macroinvertebrates and a few algal taxa such as diatoms), is time consuming and remains at a lower taxonomic resolution, so that the identifications can be done routinely by non-experts with an acceptable learning curve. Here, novel genetic and genomic tools provide new solutions to speed up the process and allow to include a much greater proportion of biodiversity in the assessment process. further, results are easily comparable through the genetic 'barcodes' used to identify organisms.

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The aim of the large international COST Action *DNAqua-Net* (http://dnaqua.net/) is to develop strategies on how to include novel genetic tools in bioassessment of aquatic ecosystems in Europe and beyond and how to standardize these among the participating countries. It is the ambition of the network to have these new genetic tools accepted in future legal frameworks such as the EU-Water Framework Directive (WFD; 2000/60/EC) and the Marine Strategy Framework Directive (2008/56/EC). However, a prerequisite is that various aspects that start from the validation and completion of DNA Barcode reference databases, to the lab and field protocols, to the analysis processes as well as the subsequently derived biotic indices and metrics are dealt with and commonly agreed upon. Furthermore, many pragmatic questions such as adequate short and long-term storage of samples or specimens for further processing or to serve as an accessible reference need also be addressed. In Europe the conformity and backward compatibility of the new methods with the existing legislation and workflows are further of high importance. Without rigorous harmonization and inter-calibration concepts, the implementation of the powerful new genetic tools will be substantially delayed in real-world legal framework applications.

After a short introduction on the structure and vision of *DNAqua-Net*, we discuss how the *DNAqua-Net* community considers possibilities to include novel DNA-based approaches into current bioassessment and how formal standardization e.g. through the framework of CEN (The European Committee for Standardization) may aid in that process (Hering et al. 2018, Leese et al. 2016, Leese et al. 2018. Further we explore how TDWG data standards can further facilitate swift adoption of the genetic methods in routine use. We further present potential impacts of the legislative requirements of the Nagoya Protocol on the exchange of genetic resources and their implications for biomonitoring. Last but not least, we will touch upon the rather unexpected influence that the new General Data Protection Regulation (GDPR) may have on the bioassessment work in practice.

Keywords

Bioassessments, e-DNA, metagenomics, water quality, standards, legislation, Nagoya Protocol, GDPR,

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